LOCKHART TECHNOLOGY

# MODEM PROGRAM

# USER'S GUIDE

for the

VADCG Terminal Node Controller +

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The "MODEM" program is a program that may be loaded into the VADCG TNC+ which enables it to generate the CCITT V.52 pseudo-random data stream. This special data stream is used to test the bit error rate for modems and is also used to generate "eye" patterns for analysis and tuning of digital systems. Usually this feature/capability is only found on special digital test equipment costing many thousands of dollars. It is hoped that this facility will enable radio Amateurs to tune up their packet radio equipment so that it is more reliable. Analysis of most of the packet radio signals heard on the VHF bands shows that most are improperly adjusted - off-frequency, over modulated and 'twist' are some of the commonest problems in the transmissions. Another set of problems is likely occurring in the receiving side. An "eye" pattern analysis will show up these and other problems and show when the system is operating correctly. It is also hoped that this facility in the TNC+ will help with the development and testing of newer and higher speed modem systems that are needed to further the development of Amateur packet radio technology.

The bit stream generated by the MODEM program is pseudo random in that it repeats the bit pattern after every 511 bits and that the pattern is made up of an almost equal number of 0's and 1's. The pattern also contains all possible combinations of 8-bit codes.

The bit rate of the pattern is determined in the usual way - by setting the timing chain in the TNC+ to the desired clocking rate. This is only necessary when testing a system operating at other than your normal operating rate.

**OPERATION**

After the modem program has been loaded into the TNC+ and the clock speed has been set to the desired value (if necessary), it is only necessary to use the (P)rogram command to start the MODEM program. The program will bring up the RTS (Request to send) line and begin to transmit the bit stream continuously. In order to return to the monitor program again, it is only necessary to hit any key on the keyboard and the transmission will stop.

**NOTES**

Since the transmission is continuous it may be necessary to disable any watchdog circuit in the modem or attached equipment which will force a shutdown after a certain period. In some situations it may only be necessary to increase the timeout period of the watchdog circuitry to a suitable longer period.

The MODEM program uses the Transmit Transparent command of the Intel 8273. Unfortunately, this command does not support the early transmit interrupt feature and so requires the periodic re-issueing of the Transmit Transparent command. This causes a very short "glitch" in the transmission which causes a few bits to not be part of the V.52 pattern. This will occur approximately every 10 minutes when operating at 1200 BPS or approximately every 2.5 minutes at 4800 BPS and at proportionately shorter intervals at higher speeds. Although this does not cause any problem when using the program to display "eye" patterns, it will cause an indication of higher errors than are actually occurring when it is used for Bit Error Rate analysis. (It may be possible to use it for this purpose when an adjustment factor is determined.)